

## ATTACHMENT A

**ATTACHMENT A**  
**SCOPE OF WORK**  
**FOR**  
**RELEASE ASSESSMENT**

FOR FORMER SERVICE STATION SITE LOCATED AT  
11198 WASHINGTON PLACE  
CULVER CITY, CALIFORNIA  
(PRP SITE NO. 6)

**INTRODUCTION**

This Scope of Work is provided as an attachment to Orders directed to Respondents, Conoco, Inc., Kayo Oil Company and Douglas Oil Company of California, by the California Regional Water Quality Control Board, Los Angeles Region (Cleanup and Abatement Order No. 99-006), and the United States Environmental Protection Agency, Region 9 (Administrative Order US EPA Docket No. RCRA 7003-09-99-0004).

The purpose of these Orders, and this common Scope of Work, is to require Respondents to collect the data necessary for the Agencies to determine the nature, magnitude and extent of gasoline constituent contamination due to releases from the former service station site and the appropriate response.

The Agencies have organized the release assessment into a three tiered approach. **The Respondents shall, at a minimum, collect data and perform analyses required by Tier 1. The requirement for the Respondents to perform the work required by subsequent tiers will be determined by the Agencies based on the results obtained from work conducted pursuant to previous tiers.**

**Respondents shall conduct all work performed pursuant to the Orders and this Scope of Work in accordance with the Agencies' General Requirements for Release Assessments (Attachment B).**

**DEFINITIONS**

1. The term "Agencies" in this Scope of Work shall mean either (1) the California Regional Water Quality Control Board, Los Angeles Region, or (2) the United States Environmental Protection Agency, Region 9, or (3) both of these agencies acting jointly. Neither a challenge to one agency's order nor the decision by one agency not to enforce its order will affect the ability of the other agency to enforce all requirements of that agency's order, including this Scope of Work.
2. The term "shallow unnamed aquifer" shall mean the uppermost, laterally persistent, saturated zone beneath the site. The base of the shallow unnamed aquifer occurs approximately 95 feet below ground surface (bgs) and has varied in thickness (due to pumping conditions at the Charnock wellfields) from approximately 10 to

approximately 35 feet. Currently, the shallow unnamed aquifer is believed to be an unconfined aquifer.

3. The term “production (Silverado) aquifer” shall mean the saturated zone that is located below, and typically separated from, the shallow unnamed aquifer by a confining layer that has been reported to vary from approximately 1 to more than 10 feet thick. In the vicinity of the site, the total thickness of the production (Silverado) aquifer is not accurately known; however, it is believed to be up to approximately 200 feet thick on the basis of Charnock Sub-Basin investigations. Because the thickness of the confining layer between the shallow unnamed and Silverado aquifers thins to as little as one foot, the Agencies believe that the confining layer may be locally absent and, depending on pumping conditions at the Charnock wellfields, the shallow unnamed aquifer and the production (Silverado) aquifer are likely in contact and direct hydraulic communication. Therefore, in a regional sense, the shallow unnamed aquifer and the production (Silverado) aquifer are parts of the same aquifer system.
4. The term “release” in this Scope of Work shall mean “discharge” or “disposal” as those terms are used in RCRA and the California Water Code.

#### **TIER 1 – DATA COLLECTION FOR DETERMINATION OF MASS RELEASE OVER TIME TO SHALLOW GROUNDWATER**

On or before June 16, 1999, Respondents shall prepare a detailed workplan for the Tier 1 activities and submit copies as specified in the General Requirements. Following the Agencies’ approval, or approval with modifications, Respondents shall implement the approved workplan in accordance with any Agency-directed modifications.

1. **Mass of oxygenates and octane enhancers delivered to the facility** – The Respondents must provide the mass of MtBE, TBA, DIPE, TAME, and ETBE delivered to the facility. Respondents must report this information by compound and indicate the mass managed annually. The Respondents must provide documentation and records as to the source of the mass data (e.g., invoices and production data from previous fuel vendors and suppliers, California Board of Equalization fee records, facility fuel throughput, general industry publications, source of gasoline supply, refinery data, etc.). If facility specific data are not available, then Respondents must use general sources of data (e.g., industry journals, refinery records, government publications, etc.) to estimate mass figures. If personnel communications are used, Respondents must provide this information in writing from the source of the information with an attached affidavit. Respondents must provide the name, address, and phone numbers of any persons interviewed.
2. **Mass and duration of discharge of gasoline and gasoline constituents from the facility to the subsurface from each discharge point** - To the most accurate extent practicable, the Respondents must provide the mass of and duration of discharge of

gasoline from each discharge point. The Respondents shall include the overall mass of gasoline discharged and the mass of MtBE, TBA, DIPE, TAME, and ETBE discharged. The Respondents shall make this determination by conducting evaluation of data including but not limited to: fuel inventory records, fuel inventory control accuracy, remediation records, leak detection methodology, tank integrity testing records, tank integrity testing methodology, environmental media concentration data, and available scientific literature. The Respondents shall provide all data, information, records, calculations, and records of communications to support their mass discharge determinations.

- 3. Release Mechanisms** – The Respondents must identify and characterize, in detail, the source location, or area, source strength, release mechanisms, and timing for releases from the Former Service Station Site. The Respondents shall analyze available inventory records to identify timeframe and duration of release(s). Respondents shall reconstruct, to the maximum extent possible, the release scenario(s) and provide supporting original documentation. Respondents shall identify, locate, and interview individuals present during, or knowledgeable of, the removal activities. Respondents shall document efforts to obtain this information and the contents of these interviews with an attached affidavit. Respondents shall provide the name, address, and phone number of each person interviewed.
- 4. Exploratory Borings and Soil Sampling** – Respondents shall advance at least 58 exploratory soil borings to a depth 10 feet below the historic low water table (approximately 85 feet below ground surface at the Former Service Station Site). Respondents shall install these borings on the uniform grid spacing and at the locations (to the maximum extent practicable) depicted in Figure A-1. At the 10 boring locations indicated in Figure A-1, Respondents shall continuously core during boring installation and, in accordance with the General Requirements (Attachment B), collect discrete-depth groundwater and co-located soil samples for chemical analysis.
- 5. Soil Sampling Density Increase Contingency Program** - If any gasoline oxygenate (including but not limited to MTBE, TBA, DIPE, TAME or ETBE) is detected in any of the samples from an exploratory boring (including borings for monitoring well installation) at a concentration above the Method Detection Limit for the particular compound, Respondents shall install and sample additional borings around the boring with detections at a spacing of 5 feet, as depicted in Figure A-2. Respondents shall continue to advance and sample additional borings until either (1) all soil samples from all perimeter borings do not detect gasoline oxygenates above the Method Detection Limit, or (2) the Agencies state, in writing, that no additional borings are required.
- 6. Geophysical Logging** - Respondents shall perform a geophysical survey of the 10 borings and 10 monitoring well locations, as depicted in Figure A-1.

## **7. Groundwater Monitoring Wells –**

a) Respondents shall install at least 10 additional monitoring wells in the shallow unnamed aquifer, at the locations depicted in Figure A-1 to the maximum extent practicable. Respondents shall continuously core and follow the General Requirements for exploratory borings and soil sampling when advancing the borings for these monitoring wells. During installation of these wells Respondents shall collect discrete-depth groundwater samples for chemical analyses at 1.5-foot intervals between elevations 4.5 feet above and below the historic high and low stands, respectively, of groundwater. After the monitoring wells are constructed, Respondents shall develop and sample the wells in accordance with the General Requirements. During initial sampling of the wells installed, Respondents shall sample and analyze for the geochemical parameters listed in Tables 3 and 4 of the General Requirements.

b) Based on results of data collected, the Agencies will determine the number and location of additional monitoring wells the Agencies may require to be installed. The Agencies' Project Coordinators will provide this requirement and associated schedule in writing. Respondents shall provide a workplan for installation of the additional wells within 30 days of receiving this written requirement.

**8. Analysis of Release Weathering/Degradation** – Respondents shall identify compounds uniquely associated with fuel formulations managed at the Former Service Station Site in order to characterize (“fingerprint”) the chemical nature of the release. Respondents shall estimate the degree of chemical, physical, and biological weathering of the gasoline. The analysis shall include mass balance analysis. Respondents shall provide all data, references, and calculations used in the analysis.

**9. Anthropogenic Pathway Characterization** – Respondents shall identify all anthropogenic features and events that may have influenced the migration of constituents away from the gasoline release points at this facility. At a minimum, Respondents' characterization shall include the following features: history of groundcover, underground utilities, vegetation irrigation, construction projects, water line breaks, and environmental investigations. Respondents' characterization shall include appropriate quantitative evaluations and determinations in order for these features and events to be included in a transport model.

**10. Mass Release Analysis** – Based on the data gathered from items 1-9 above, previously existing data, and scientific data and literature, the Respondents shall submit an analysis showing the mass transport over time for gasoline, gasoline oxygenates, and gasoline constituents identified as uniquely associated with fuel formulations managed at the Former Service Station Site from the release point to the shallow groundwater.

**11. Quarterly and Annual Groundwater Monitoring** - Respondents shall continue to perform quarterly and annual groundwater monitoring required by the Agencies' July 30, 1998 letter, as amended by the General Requirement (Attachment B) and shall incorporate the newly installed monitoring wells into the quarterly and annual groundwater monitoring program.

**12. Tier 1 Technical Report** – Within 180 calendar days after receiving the Agencies' workplan approval, or approval with modifications, the Respondents are required to submit a Tier 1 Technical Report in accordance with the Agencies' General Requirements for Release Assessments.

**TIER 2 – DATA COLLECTION FOR DETERMINATION OF MASS RELEASE OVER TIME BETWEEN THE SURFACE OF THE SHALLOW GROUNDWATER AND THE PRODUCTION (SILVERADO) AQUIFER**

Within 45 days of receiving written instruction by the Agencies to do so, Respondents shall prepare a detailed work plan for the Tier 2 activities and submit the Tier 2 work plan to the Agencies for review. Following the Agencies' approval of a work plan, or approval with modifications, Respondents shall begin implementation of the approved work plan in accordance with any agency-directed modifications.

- 1. Borings and Groundwater Monitoring Well Clusters** – As instructed and modified by the Agencies' response to the Tier 1 Report, Respondents shall drill borings, collect soil and discrete-depth groundwater samples, and complete borings as monitoring well clusters in all aquifers. These borings and wells shall be sufficient to quantify the mass distribution and pathways of gasoline constituents released from the facility. Respondents shall install monitoring wells to fully delineate any free- and dissolved-phase plumes.
- 2. Chemical Analysis** - As instructed and modified by the Agencies' response to the Tier 1 Report, Respondents shall characterize all aquifers and aquitards in the area beneath the site. For the purpose of this work, an "aquifer" shall be understood to be any subsurface, water-saturated zone, whether ephemeral or not, capable of yielding water to a monitoring well or piezometer constructed within it. The characterization shall include all perched and regionally extensive saturated zones, and associated confining layers, to at least a depth of the middle of the production (Silverado) aquifer. The Respondents shall use a network of continuously cored and logged soil borings utilizing discrete-depth sampling, piezometers, and monitoring wells to complete the characterization.
- 3. Geochemical Analysis** - As instructed and modified by the Agencies' response to the Tier 1 Report, Respondents shall perform geochemical characterizations of aquifers. Respondents shall characterize these aquifers with respect to major/minor anions and cations, pollutants (herbicides, pesticides, detergents, caffeine, etc.), and isotopic

composition. Respondents shall collect data sufficient to define water sources, ages, and mixing between aquifers.

4. **Hydrogeologic Testing** - As instructed and modified by the Agencies' response to the Tier 1 Report, respondents shall define the physical and hydraulic properties of aquifers and aquitards. Respondents shall collect sufficient data through laboratory, slug, and pumping tests to estimate population statistics for all parameters to support probabilistic groundwater flow and transport modeling in the region between the surface of the shallow groundwater and the production (Silverado) aquifer beneath the site. Respondents shall use the data to identify and define heterogeneity and anisotropy (direction and magnitude) within aquifers and aquitards, and identify and characterize boundaries and boundary conditions for all aquifers.
5. **Geologic Analysis** – Respondents shall perform a detailed stratigraphic/depositional environment (facies) analysis of the soils beneath the Former Service Station Site. The work shall be done under the direct supervision of, and certified by, a California Registered Geologist, Professional Engineer, or Certified Engineering Geologist with experience in the conceptual reconstruction of paleodepositional environments. Respondents shall use scientific literature sources, detailed observations from borehole logging, soil physical testing results and results of geophysical logging in performing this analysis. The Respondents shall identify the depositional environment for all soil horizons penetrated in the vadose and saturated zones. The Respondents shall determine the general direction(s) of sediment transport, the Former Service Station Site setting relative to depositional and erosional environments (e.g., banks, channels, bars, beaches, etc.) and, through the use of statistical approaches, such as variograms or other accepted geostatistical approaches, quantify the heterogeneity and directional orientation and magnitude of anisotropy of lithologic and physical properties (such as horizontal and vertical pneumatic/hydraulic permeability) that influence contaminant migration in various soil types.
6. **Transport Model** - As instructed and modified by the Agencies' response to the Tier 1 Report, the Respondents shall construct a numerical groundwater model in order to analyze the mass release over time from the facility to the production (Silverado) aquifer using the data gathered in items 1-5 above.
7. **Tier 2 Technical Report** – By a date to be determined by Agencies after approval, or approval with modification of the Tier 2 workplan, the Respondents must submit a Tier 2 Technical Report which includes the following information:
  - a. Narrative description of work performed and information collected, organized according to Items 1 through 6 above,
  - b. Summary of all data collected in tabular and graphic forms,
  - c. Geologic cross sections covering the area investigated with analytical data posted and stratigraphic correlations shown,
  - d. Geologic fence diagrams covering the area investigated,

- e. 20 depth-specific layer maps with analytical data posted and stratigraphic correlations shown,
- f. Contour maps of the potentiometric surface of each aquifer investigated,
- g. Raw data files for slug and aquifer tests and graphical plots of drawdown vs. time and, if applicable, distance for each well monitored,
- h. Contour maps of aquifer potentiometric surfaces resulting from aquifer tests,
- i. Stiff and Piper diagrams representing groundwater geochemistry,
- j. Plots of isotopic concentrations or isotopic ratios relative to standard mean ocean water or other accepted standards,
- k. Chain of Custody Records,
- l. Lab Analysis Sheets,
- m. Chromatographs,
- n. Boring and Well Construction Logs,
- o. Monitoring well development and purging field logs,
- p. Investigation-derived waste shipping and disposal/recycling documents.

**TIER 3 – DATA COLLECTION FOR FACILITY SPECIFIC MODELING BETWEEN THE FACILITY SPECIFIC RELEASE LOCATION AND THE CHARNOCK WELLFIELDS, PREPARATION OF NUMERICAL GROUNDWATER FLOW AND TRANSPORT MODEL.**

Within 60 days of receiving written instruction by the Agencies to do so, Respondents shall prepare a detailed work plan for the Tier 3 activities and submit it to the Agencies for review. Following Agencies' approval, or approval with modifications, Respondents shall implement the approved plans in accordance with any agency-directed modifications.

During this Tier, the Respondents will be required to construct regional multilevel groundwater monitoring well clusters and gather data and develop a numerical groundwater flow and transport model.

The location and number of the multilevel monitoring wells clusters will be determined by the Agencies based on the results of the previous tiers. The Respondents shall complete all work described in items 2, 3, 4, and 5 of Tier 2 for all new borings and monitoring wells.

The Respondents shall develop a numerical model to simulate three-dimensional multiphase saturated flow and transport within all zones of the production (Silverado) aquifer. The boundaries of the model must be sufficiently distant from both the site and the wellfields to minimize influences of the model boundaries on the modeled region between the Former Service Station Site and the wellfields. The model must accurately assess the horizontal and vertical components of flow and must be used to determine the most likely flow paths and timing for contaminant migration from the Former Service Station Site to the wellfields.



The necessary data collection and analysis required in this tier include determination of aquifer properties, development of a water balance, establishment of boundary conditions, compilation of production data (production capacity and actual past production data), model calibration, flow and transport simulations, analysis of results, and reporting.

### **PROGRESS REPORTING**

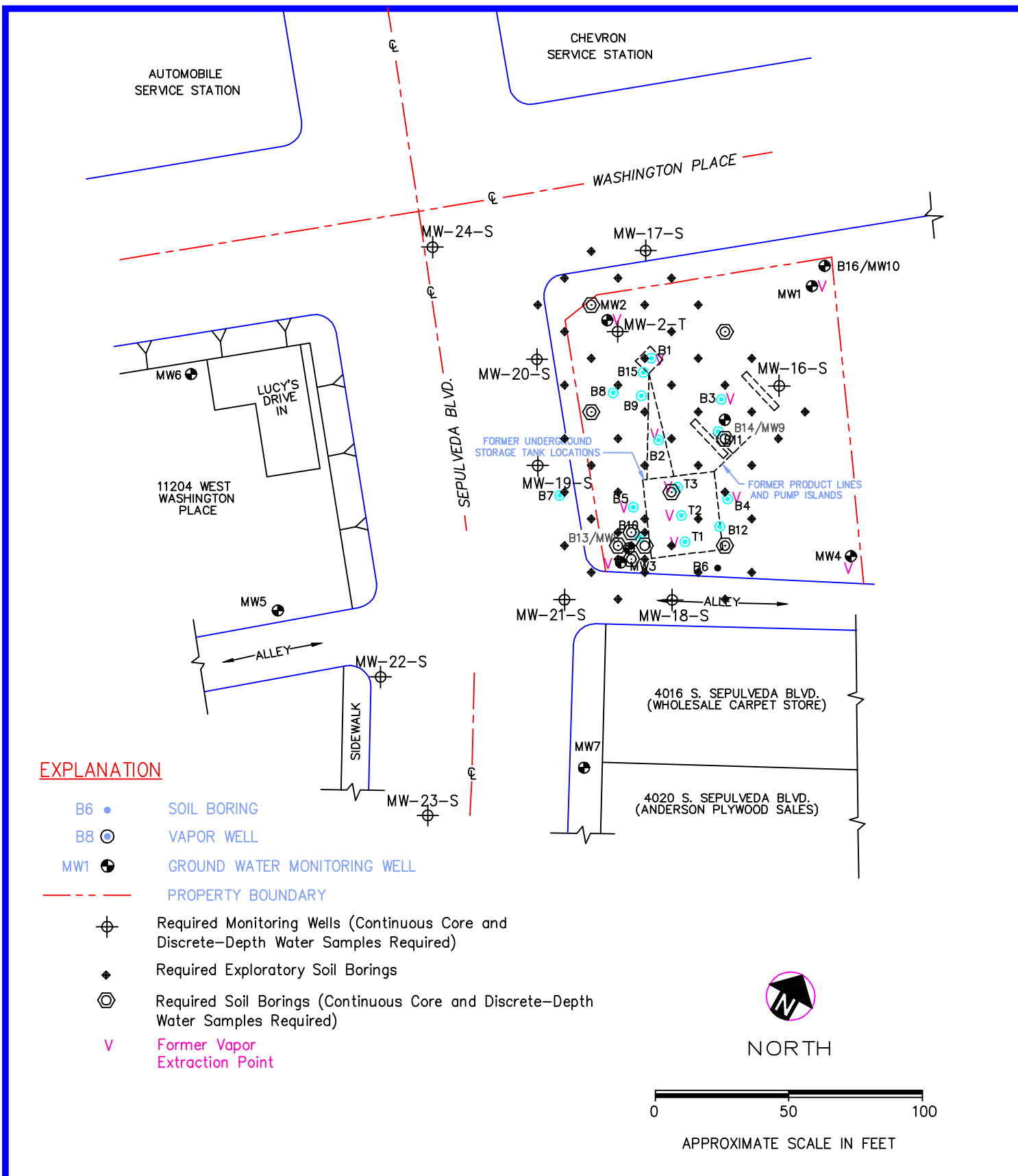
Monthly progress reporting is required for all tiers required by this Scope of Work. The first report under this schedule is due on or before June 16, 1999. Monthly Progress Reports shall include at a minimum, but not be limited to the following information:

- 1) a discussion of all completed activities and on-going work activities during the reporting period;
- 2) a discussion of proposed work activities for the next reporting period;
- 3) an updated time schedule for completion of all work activities needed to complete all activities required by this Scope of Work;
- 4) data collected, including any lab results of any soil and/or groundwater monitoring completed during the reporting period.

**SCHEDULE OF COMPLIANCE**

Work performed pursuant to the Agencies' Orders and this Scope of Work is required to comply with the schedule below (Table A-1).

<b>Table A-1 SCHEDULE OF COMPLIANCE</b>	
<b>TASK</b>	<b>DUE DATE</b>
First Monthly Progress Report	On or before June 16, 1999
Subsequent Monthly Progress Reports	30 calendar days after the due date of the previous Monthly Progress Report
Quarterly Groundwater Monitoring Reports	July 15, 1999 and quarterly thereafter in accordance with the General Requirements
Tier 1 Workplan	On or before June 16, 1999
Tier 1 Field Work Start Date	In accordance with Agencies' written approval
Tier 1 Technical Report	180 calendar days after Agencies' approval or approval with modification of the Tier 1 Workplan
Tier 2 Workplan	45 calendar days after the instruction from the Agencies to proceed with Tier 2
Tier 2 Field Work Start Date	In accordance with Agencies' written approval
Tier 2 Technical Report	To Be Determined by the Agencies
Tier 3 Workplan	60 calendar days after the instruction from the Agencies to proceed with Tier 3
Tier 3 Field Work Start Date	In accordance with Agencies' written approval
Tier 3 Technical Report	To Be Determined by the Agencies



Los Angeles Regional Water Quality  
Control Board

United States Environmental  
Protection Agency

**TIER 1 GASOLINE CONSTITUENT RELEASE ASSESSMENT**  
LOCATIONS FOR REQUIRED SOIL BORINGS AND MONITORING WELLS

FORMER CONOCO STORE NO. 05625  
11198 WASHINGTON PLACE  
CULVER CITY, CALIFORNIA

FIGURE:

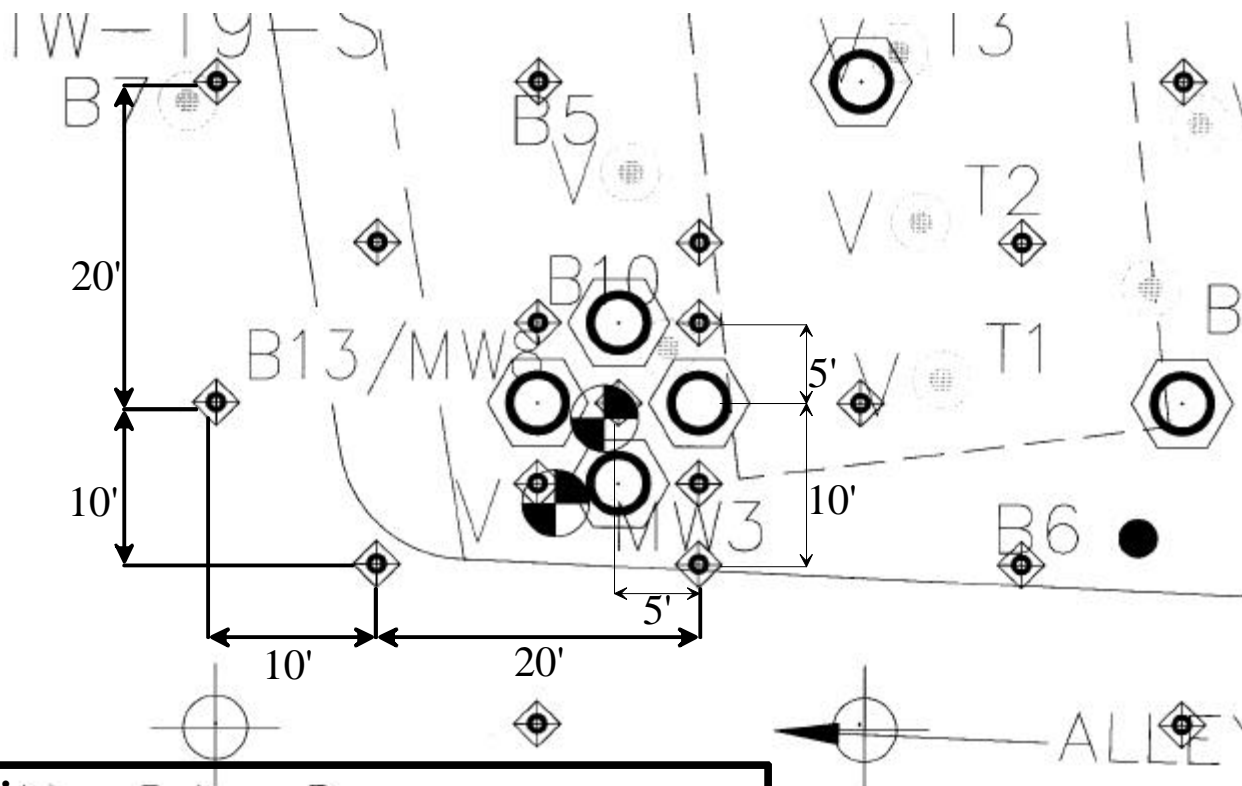
A-1

DWG NO:

PROJECT:

DATE:

MARCH 1999

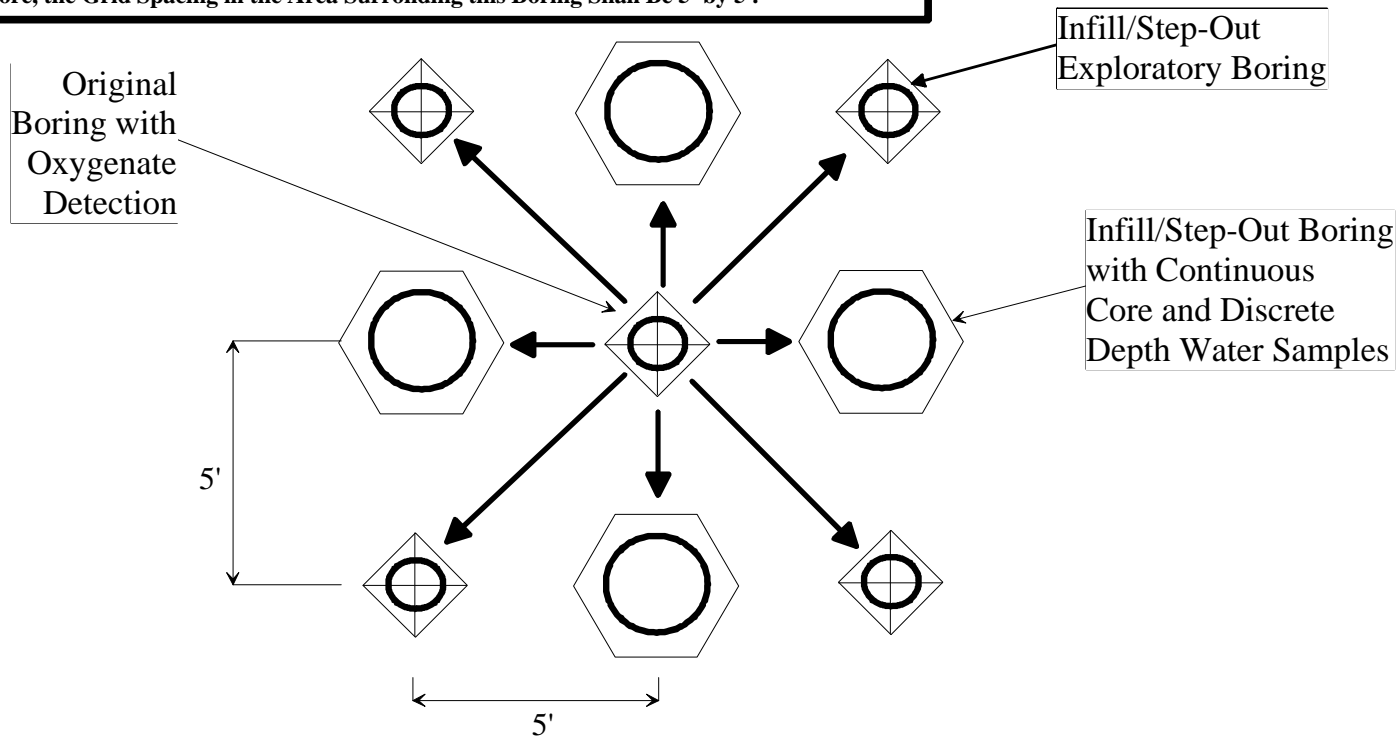


## Boring Spacing

Regular Grid Spacing of 20' by 10' Oriented as Depicted Above.

Infill to 5' by 5' Grid Surrounding All Borings with Detections of Oxygenates as Depicted Below.

For Example, Boring B-13 had Detections of Oxygenates.  
Therefore, the Grid Spacing in the Area Surrounding this Boring Shall Be 5' by 5'.



Los Angeles Regional Water Quality  
Control Board

United States Environmental  
Protection Agency

TIER 1 GASOLINE CONSTITUENT  
RELEASE ASSESSMENT

BORING SPACING AND BORING  
INFILL/STEP-OUT REQUIREMENTS

Figure

A-2

## ATTACHMENT B

**ATTACHMENT B**  
**GENERAL REQUIREMENTS**  
For  
**RELEASE ASSESSMENTS**  
**CHARNOCK SUB-BASIN INVESTIGATION AREA**

These General Requirements specify the requirements for work directed in the Scope of Work for Release Assessment (SOW). Any work elements required by the SOW, for which procedures are not specified in the SOW or below, shall be performed in a manner that the Respondents' licensed professional responsible for directing such work elements determines will supply results of the highest confidence and reliability. Site-specific deviations from the requirements provided herein shall require the Agencies' approval and will be made at the sole discretion of the Agencies. Respondents shall not initiate work prior to providing written notification to the Agencies' Project Coordinators or without written pre-approval from the Agencies' Project Coordinators. (Note: Respondents shall provide written notification to the Agencies and Impacted Parties by electronic mail to the list in Table 2 of this document.) "The Agencies" shall mean the California Regional Water Quality Control Board, Los Angeles Region, or the United States Environmental Protection Agency, or both of these agencies acting jointly.

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**I. WORKPLANS**

The SOW requires the Respondents to submit detailed workplans and receive approval of the Agencies prior to implementing the required work.

Workplans shall include, but not be limited to, the following:

- 1) Objectives of the investigation.
- 2) A detailed description and rationale for selection of all sampling locations which are not specified by the Agencies.
- 3) Scaled site maps showing the locations of all previous, existing and planned boring(s)/sampling location(s).
- 4) The range of depth to the uppermost saturated zone and groundwater flow conditions prior to shutdown of the Charnock Wellfields. Refer to the maximum elevation of the historic range of groundwater as the "high stand" and, similarly, to the minimum elevation of the historic range of groundwater as the "low stand."
- 5) A detailed description of the lithology at the site, the contaminant release mechanism(s), contaminant migration, and current groundwater flow conditions.

- 6) A description and sample timeline of how the collection and chemical analysis of soil samples from borings will be coordinated to allow for efficient implementation of the soil sampling density increase contingency program specified in the SOW.
- 7) A description of field methods and standard operating procedures specifically developed for the SOW and consistent with these General Requirements. This description shall also be consistent with EPA quality assurance guidance listed in number 15 below. The description may be provided in an appendix or appendices. Respondents shall specify and explain extraction method(s) and procedures to be used to prepare samples for hydrocarbon analyses based upon soil type and hydrocarbon characteristics. Fine-grained soils (clay or silt) or long-chain hydrocarbons require sufficient extraction time, which must be identified in the workplan.
- 8) Respondents shall propose analytical methods and laboratory SOP to be used for fingerprinting analysis required in Tier 1 of the SOW. Respondents shall propose QA/QC and data validation procedures for such fingerprinting analyses.
- 9) A tabular summary showing all soil and groundwater chemical and physical data collected to date. This summary shall include all QC samples, and sample locations identified by both sample identification number and surveyed three-dimensional coordinates. For previously collected data which was not surveyed, provide coordinates based on map interpolation. This table shall be submitted both in printed copy and in electronic spreadsheet format.
- 10) A tabular summary of all monitoring well screen intervals, completion depths, filter packed interval, seal interval, survey elevation, water elevations, free product thickness (if present), and surveyed three dimensional coordinates. For previously collected data which was not surveyed, provide coordinates based on map interpolation.
- 11) The Tier 1 Workplan shall contain all soil boring logs and well drilling/construction logs from all prior work conducted at the site. Tier 2 and Tier 3 Workplans do not need to include previous boring log and well drilling/construction log information.
- 12) When monitoring wells are to be installed, the workplan must specify well design criteria, specifications, and construction details including casing, filter pack, screen materials and diameter, screen length and placement with respect to water table, and depth and type of annular seal.
- 13) Identification and rationale of the drilling method(s) and decontamination procedures to be used.
- 14) Description of disposal plans for all investigation derived wastes, including soil cuttings, purge water, decontamination water, and well development water.

- 15) A project schedule depicting the planned start, duration, and predecessor/successor relationship(s) of all major project tasks, including a work element for implementing a soil sampling density increase contingency program.
  - 16) A Quality Assurance Project Plan consistent with the following EPA guidance:  
  
*EPA Guidance For Quality Assurance Project Plans, EPA QA/G-5, February 1998, EPA/600/R-98/018.*
  - 17) A Site Health And Safety Plan commensurate with the scope and nature of work to be completed. The Site Health and Safety Plan shall be prepared under the direction of, and signed by, a Certified Industrial Hygienist.
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## **II. FIELD PROCEDURES**

Respondents must develop and implement Release Assessment workplans consistent with the following procedures.

**A. FIELD WORK NOTIFICATION:** Do not proceed with field work without prior written approval from the Agencies. Notify the Agencies' Project Coordinators in writing at least 5 business days prior to initiating field work.

### **B. EXPLORATORY BORINGS AND SOIL SAMPLING:**

- 1) All drilling tools shall be thoroughly steam cleaned immediately before each boring is started.
- 2) Soil borings shall be completed using drilling/boring methods that: minimize potential cross contamination and volatilization, do not use drilling fluids, and produce the minimum physical disturbance to the material being sampled, such as hollow-stem auger methods. Respondents shall submit a written request including rationale and obtain written approval of the Agencies prior to using other drilling methods.

Soil samples obtained by any air or fluid drilling methods shall not be submitted for analyses of petroleum hydrocarbons, aromatic hydrocarbons, MTBE, TBA, TAME, DIPE, ETBE or any other volatile compounds, unless Respondents request and obtain written approval of the Agencies to do so.



- 3) Soil samples shall be collected using sampling methods that minimally disturb the soil matrix, minimize the generation of frictional heating, and minimize the aeration of the soil sample, such as driven split-spoon or thin-walled samplers. Respondents shall use soil sample rings at least 2" (diameter) by not more than 3" (length).
- 4) All borings shall be constructed at the locations specified in the SOW to the maximum extent practicable. Borings locations may not be moved greater than five (5) feet from the specified location in the SOW without the prior written approval of the Agencies.
- 5) As specified in the SOW, specific borings and all pilot stratigraphic borings for monitoring wells shall be continuously cored/sampled and geologically logged.
- 6) Borings must be extended beyond the planned total depth if there is detectable soil contamination at the planned terminus of the borehole (as indicated by an organic vapor analyzer equipped with a flame ionization detector [OVA] or on-site lab).
- 7) All borings shall be logged by an experienced geologist under the direct supervision of a California Registered Geologist, Professional Engineer, or Certified Engineering Geologist. Boring logs must be reviewed and signed by a California Registered Geologist, Professional Engineer, or Certified Engineering Geologist. At a minimum the geologic log must include:
  - a) Description of earth materials, conditions (moisture, color, etc.), and classifications per Unified Soil Classification System (USCS);
  - b) Detailed description of soil structure and composition sufficient to support paleodepositional analysis and reconstruction;
  - c) Sample depths, in feet;
  - d) For driven samples, penetration in blows per foot (blow counts) and inches (or percent) of sample recovered;
  - e) Vapor readings of samples using OVA field headspace screening methods. The method used shall allow the tip of the OVA instrument to be inserted through a membrane to minimize potential loss of headspace gas during the measurement.
- 8) Soil samples for chemical analysis shall be collected and analyzed at a minimum of five (5) foot depth intervals.
- 9) Additional soil samples for chemical analysis shall be collected and analyzed at locations where OVA field screening measurements are 10 ppm greater than the ambient background. Field screening will be done for all lengths of core **not** contained in sample rings. Screening will be performed at the same time as, or immediately following, collection of 5-foot interval samples.
- 10) For borings that are continuously cored, additional samples for chemical analysis shall also be

collected at a contact where changes in lithology result in a finer grained soil underlying a coarser soil.

- 11) Soil samples for physical property testing shall be collected from every representative lithologic type encountered in all borings and well locations specified for continuous coring in the SOW.
- 12) Collect discrete and undisturbed soil samples, seal with no headspace, and transport to the testing laboratory for chemical analysis. Soil sample collection/preservation shall be in accordance with the following:
  - a) **For Soil Samples Collected in Driven Rings.**  
After collection, immediately seal rings air-tight. Sample rings shall kept at 4 degrees C or less. Maximum hold time for this method shall be 48 hours.
  - b) **For Soil Samples Collected from Continuous Core utilize either:**
    - i) the Encore Device (as specified in SW-846 Method 5035) or equivalent. Position plunger bottom flush with bottom of coring body. Push sampler into soil core until coring body is completely full. When full, seal sampling device and place on ice for shipping. Use all actions necessary to minimize the loss of volatiles. Maximum holding time for this method shall be 48 hours at 4 degrees C. An additional 5 days (for at maximum holding time of 120 hours) are permissible if the Encore device is kept below - 4 degrees C; or
    - ii) Cut-off Syringe. Samples should be collected by positioning plunger flush with opening in syringe, plunging a cut-off syringe into the soil core, placing the syringe into a 40 mL VOA containing organic free reagent water (no acid), and extruding sample into reagent water. Use all actions necessary to minimize the loss of volatiles. Maximum holding time for this method shall be 48 hours at 4 degrees C or less.
- 13) Comply with sample chain of custody procedures equivalent to those in Section 9.2.2.7, Chapter 9 of SW846 Update III.
- 14) All soil borings shall be surveyed relative to the California State Plane Coordinate System. The vertical and horizontal surveys shall be referenced to the North American Datum of 1927 (NAD27) and the National Geodetic Vertical Datum of 1929 (NGVD29). X, Y, and elevation coordinates shall be given for all data points in reporting documents.

### **C. DISCRETE-DEPTH GROUNDWATER AND SOIL SAMPLING:**

Discrete-depth water and co-located soil samples shall be collected and analyzed from the locations identified in the SOW using the following procedures:

- 1) Samples shall be collected using a special sampling device, such as the SimulProbe, or equivalent. Note that the SimulProbe device also allows the collection of relatively undisturbed soil samples from the depth at which the groundwater sample is collected.
- 2) The specific sampling device chosen must be designed and used such that the sampling vessel(s) do not contact groundwater, drilling fluids, or air until the sampler is positioned at the desired sampling depth and groundwater collection begins.
- 3) The Respondents shall determine the range of elevations over which groundwater beneath the site varied prior to shut down of the Charnock well fields. Data from earlier investigations at the site, nearby sites, or public agency files shall be used to identify the historic range of groundwater elevations. The maximum elevation of the historic range of groundwater is referred to as the “high stand” and, similarly, the minimum elevation of the historic range of groundwater is referred to as the “low stand.” At specific locations prescribed in the SOW, the Respondents shall collect discrete-depth groundwater samples and co-located soil samples at 1.5-foot increments through the elevation interval from 4.5 feet above the high stand of groundwater to 4.5 feet below the low stand of groundwater. Soil samples shall be preserved, packaged, sealed and transported to the testing laboratory in accordance with procedures described in Section II.B., Number 12 of these General Requirements.

### **D. GEOPHYSICAL LOGGING:**

As identified in the SOW, specific borings, wells, and pilot stratigraphic borings required for monitoring wells shall be logged using the following downhole geophysical methods.

The minimum geophysical survey suite for cased or open borings/wells is:

- EM Induction Log
- Natural Gamma Log

The minimum geophysical survey suite for holes drilled using mud rotary method is:

- EM Induction Log
- Natural Gamma Log
- Spontaneous Potential Log
- Resistivity Log
- Caliper Log
- Open Hole Sonic Log

#### **E. SOIL PHYSICAL PROPERTY TESTING:**

Soil physical properties to be determined must include the following:

- Fraction of organic carbon content ( $f_{oc}$ ) (EPA 9060)
- Grain-size distribution (ASTM D-422 or D-4464)
- Effective soil porosity (API RP40)
- Bulk density (ASTM D3550 or API RP40)
- Soil moisture content (ASTM D2216)
- Plasticity index for clayey and silty materials (Atterberg limits)
- Gas permeability (API RP40)
- Vertical and horizontal saturated hydraulic conductivity (EPA 9100 or ASTM D5084)
- Specific retention and capillary pressure/saturation characteristic curve (ASTM D425 centrifugal method, air displacing water, and/or ASTM D3152M or ASTM D2325 with 6-points minimum)

#### **F. GROUNDWATER MONITORING WELL(S) CONSTRUCTION/DEVELOPMENT:**

- 1) All drilling tools shall be thoroughly steam cleaned immediately before each boring is started.
- 2) Groundwater monitoring wells shall be installed into the aquifer or saturated zone specified in the Scope of Work.
- 3) Prior to installing monitoring wells, a continuously cored, pilot stratigraphic boring shall be advanced to the first aquitard beneath the target monitoring well depth. This boring is required to define local stratigraphy and to obtain reliable site-specific data necessary for designing the groundwater monitoring well. The pilot stratigraphic boring shall be logged carefully to define the depth and thickness of potential aquifer/aquitard material and confirm monitoring well design. If the pilot stratigraphic boring indicates conditions other than those anticipated during the planning of the monitoring well, the Respondents shall confer with the Agencies to confirm monitoring well construction details or changes to the approved plans.
- 4) All well casings, casing fittings, screens, and all other components that are installed in a well

shall be thoroughly cleaned before installation. Components which are factory pre-cleaned, certified clean, and kept in intact original factory wrapping and then opened just prior to installation do not require cleaning.

- 5) Use a minimum of 4" diameter schedule 40 PVC or stainless steel well casing material. Soil and water sampling equipment and materials used to construct a monitoring well shall be compatible with the chemicals of concern and shall not donate, mask, or alter the constituents for which analyses will be made. All perforated casings used in the construction of monitoring wells shall be factory perforated.
- 6) Well construction shall not create a vertical conduit penetrating a competent confining layer below a saturated zone. Conduct physical and hydraulic tests to determine competency of any confining zone materials. Use conductor casing where necessary to avoid creating conduits through competent confining layers.
- 7) Suspend and centralize casing materials so that they are not resting against the sides or bottom of the boring prior to fixing in place.
- 8) Place grout of either cement, bentonite, or mixture in an appropriate manner which avoids bridging.
- 9) Characterize aquifer materials based upon sieve analysis for proper selection of filter pack and screen. Less than 10% of the filter pack shall enter the well. Filter packs shall extend at least two feet above the top of the perforated zone. In cases where the top two feet of the filter pack would provide cross-connection between otherwise isolated zones or where the ground surface is less than ten feet above the highest anticipated ground water level, the height of the filter pack above the perforated zone may be reduced upon receiving written approval of the Agencies. Under such circumstances, additional precautions shall be taken to prevent plugging of the upper portion of the filter pack by the overlying sealing material.
- 10) Groundwater monitoring wells shall be sealed in accordance with local permitting requirements, or, in their absence, with the California Department of Water Resources Standards for Well Construction (Reference Bulletins 74-81 and 74-90 on Water Well Standards are available from the Department of Water Resources in Sacramento).
- 11) Well heads shall be provided with a water-tight cap and shall be enclosed in a surface security structure that protects the well from surface water entry, accidental damage, unauthorized access, and vandalism. Traffic lids shall be clearly marked as monitoring wells.
- 12) Pertinent well information including well identification, well type, well depth, well casing diameters (if more than one size is used), and perforated intervals shall be permanently affixed

to the interior of the surface security structure and the well identification number and well type shall be affixed to the exterior of the surface security structure.

- 13) All well casings shall have a bottom cap or plug.
- 14) Reference marks shall be established relative to mean sea level for each monitoring well. Provide reference mark location and survey date in the investigation report and on the well log. Measure water levels to the nearest 0.01 foot relative to the reference mark.
- 15) All monitoring wells shall be surveyed relative to the California State Plane Coordinate System. The vertical and horizontal surveys shall be referenced to the North American Datum of 1927 (NAD27) and the National Geodetic Vertical Datum of 1929 (NGVD29).
- 16) Wait at least 48 hours for well seal materials to set before well development. Develop well such that the waters sampled are representative of the formation water. Use best well development practices including bailing, surging, and pumping to obtain optimal development and minimal groundwater extraction. Obtain water sample with less than 5 NTUs of measured turbidity to be acceptable for petroleum hydrocarbon, aromatic hydrocarbons, MTBE and other required analyses.
- 17) Representative samples of additives, cement, bentonite, and filter media shall be retained for 90 calendar days for possible analysis for contaminating or interfering constituents.
- 18) All necessary permits must be obtained from the appropriate agencies prior to the start of work.

#### **G. GROUNDWATER SAMPLING:**

- 1) Wait a minimum of three days after well development prior to commencement of the initial groundwater sampling event.
- 2) Utilize purging and sampling methods such as low-flow submersible pumps operated at low-flow rates such that drawdown during purging and sampling is less than 2 ft. Methods other than low-flow submersible pumps shall only be used with the written concurrence of the Agencies.
- 3) A check valve, or similar device, shall be fitted at the bottom end of all discharge lines to ensure purged water will not flow back into the well.
- 4) Sound the total depth of groundwater monitoring wells to determine the accumulation of sediments in the bottom. If sediments have accumulated beyond 6 inches remove them.

- 5) Record details of water sampling, including:
  - a) Water level measurement procedures;
  - b) Purge equipment, techniques, purge volumes, time, parameters (pH, temperature, dissolved oxygen, conductivity, and turbidity) to assure collection of a representative water sample;
  - c) Water sampling device(s);
  - d) Procedures to minimize loss of samples by adsorption and/or volatilization.

- 6) Perform field analysis for the geochemical parameters listed in Table 1 at the frequencies indicated and utilizing the methods prescribed (or their equivalent).

<p align="center"><b>Table 1</b> <b>Field Geochemical Parameters</b></p>				
<b>Analyte</b>	<b>Method</b>	<b>Minimum Limit of Quantification</b>	<b>Precision</b>	<b>Special Requirements</b>
Alkalinity	Hach AL AP MG-L or equivalent	50 mg/L	Standard deviation of 20 mg/L	Analyze in field within 1 hour of collection, 100 mL in glass container. At initial well sampling only.
Conductivity	SW 846 Method 9050	50 $\mu\text{S}/\text{cm}^2$	Standard deviation of 50 $\mu\text{S}/\text{cm}^2$	(a) At each well sampling.
Iron (II)	Colorimetric Hach Method #8146 or equivalent	0.5 mg/L	Coefficient of variation of 20 percent	(b) At initial well sampling only.
Oxidation Reduction Potential	Standard Method for Examination of Water and Wastewater, 1992 2580B	Plus or minus 300 mV	Plus or minus 50 mV	(a) At each well samplings.
Oxygen	Dissolved Oxygen Meter	0.2 mg/L	Standard Deviation of 0.2 mg/L	(a) At each well sampling.
PH	Field Probe	0.1 standard units	0.1 standard units	(a) At each well sampling
Temperature	Field Probe	0 °C	Standard deviation of 1 °C	(a) At each well sampling

(a) Measure in a flow-through cell or overflow cell and analyze at wellhead. Use of a flow-through or overflow cell or equivalent device must be used to prevent alteration of geochemical properties by exposure to the atmosphere.

(b) Collect from a flow-through cell or overflow cell and analyze at wellhead.

- 7) Record method used for sampling handling and preservation.
- 8) Comply with sample chain of custody procedures equivalent to those in section 9.2.2.7., Chapter 9 of SW-846, Update III.



### **III. TECHNICAL REPORTS**

Reports shall include:

- 1) An introduction detailing site background and history.
- 2) Regional and site hydrogeology.
- 3) Narrative description of the scope of work performed, the rationale, and deviations from the approved workplan, if any. This shall include a description of all field drilling and sampling activities, and information collected, organized according to tasks identified in the Scope of Work,
- 4) All boring logs, well construction logs, geophysical logs, and sieve analysis results with interpretation. Boring logs shall including:
  - a) Description of earth materials, conditions (moisture, color, etc.), and classifications per Unified Soil Classification System (USCS);
  - b) Lithographic column with USCS abbreviations and symbols;
  - c) Sample type and depth in feet;
  - d) Penetration in blows per foot (blow counts) and inches (or percent) of sample recovered;
  - e) Vapor readings of headspace samples using OVA.
- 5) The groundwater contaminant plume(s) for TPH<sub>G</sub>, benzene, toluene, ethylbenzene, xylene (BTEX), MTBE, and TBA must be illustrated by plan view and cross section (to scale), including direction of section lines, scale, legend, constituent concentrations, and lithology.
- 6) 20 geologic cross sections with analytical data posted, and contoured, and stratigraphic correlations shown.
- 7) 2 geologic fence diagrams.
- 8) 20 depth-specific layer maps with analytical data posted, contoured, and stratigraphic correlations shown.
- 9) Contour map of the potentiometric surface of the shallow unnamed aquifer.

- 10) Data validation packages for all chemical analyses.
- 11) A tabular summary of all sample analytical results (this includes historical data) and detection limits (including results of field QA/QC samples) and related QA/QC data. Report all analytical results and QA/QC data on the Lab Form 10A (for petroleum hydrocarbons and volatile organics). Report concentrations for constituents identified greater than MDLs and less than estimated quantitation limit (EQL) with a "J" flag indicating an estimated concentration.
- 12) Computerized database which includes x, y, and z coordinates of all data collected during Tier 1.
- 13) Monitoring well development and purging field logs.
- 14) Investigation-derived waste shipping and disposal/recycling documents.
- 15) LARWQCB Lab Form 10A (Attachment B-1).
- 16) Conclusions based upon the analytical results and investigation findings.
- 17) Recommendations for additional work as needed.
- 18) The final technical report must be signed and sealed by a California Registered Geologist, Professional Engineer, or Certified Engineering Geologist with at least five years hydrogeologic experience.

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#### **IV. ELECTRONIC FORMAT**

All electronic submittals shall comply with the following electronic submittal requirements:

- 1) All text documents shall be submitted in a format that can be viewed with either public domain or free viewer software available for the Microsoft Windows 95, Windows 98 or Windows NT operating systems (e.g. Adobe Acrobat, Microsoft Word, HTML.)
- 2) All figures shall be submitted in a format that can be viewed with either a public domain or free viewer (see above) or in an Autocad 14 DWG or DXF format.

- 3) All data shall be submitted in electronic table format that can be viewed and manipulated using Microsoft XL 97 or Lotus 1-2-3 Version 4.0. Data tables shall include the following information for each sample:
- a) Sample Designation (name given by sample collector)
  - b) Well / Boring
  - c) Sample Type (soil, water, water level, discrete depth water, . . .)
  - d) Sample coordinates (surveyed x,y,z coordinates)
  - e) Analyte
  - f) Numerical result (Report concentrations for constituents identified greater than MDLs and less than estimated quantitation limit (EQL) with a "J" flag indicating an estimated concentration.)
  - g) Units
  - h) Collection date
  - i) Extraction date
  - j) Dilution factor
- 

## **V. DOCUMENT / INFORMATION TRANSMITTAL**

### **A. HARD COPY DISTRIBUTION**

Submit copies of all draft reports, final technical reports, workplans, data submittals, progress reports, monthly reports, and correspondence in the quantities indicated, to the Project Coordinators for each of the following entities:

Los Angeles Regional Water Quality Control Board	2 copies
U.S EPA Region 9	3 copies
City of Santa Monica	3 copies
Southern California Water Company	2 copies

### **B. ELECTRONIC DISTRIBUTION**

All documents, reports, data submittals, progress reports, monthly reports, and correspondence shall also be delivered in the electronic format (as specified in Section IV) via e-mail (for electronic files under 1 megabyte) or via CD-ROM (for electronic files over 1 megabyte).

### **C. E-MAIL DELIVERY**

Information, reports, and correspondence required to be delivered by electronic mail shall follow the requirements below:

- 1) The header or subject line of all e-mail messages shall include the Agencies' designated site number in the format: "Charnock PRP Site X" where X is the designated site number.
- 2) The text of the message shall include a description of attachments.
- 3) All attachments shall comply with the Electronic Format Requirements as specified in this document.
- 4) All messages shall be sent to all of the individuals listed in table 2.

<b><i>Table 2 – E-mail Distribution List</i></b>		
<b><u>Name</u></b>	<b><u>Organization</u></b>	<b><u>E-mail Address</u></b>
David Bacharowski	Los Angeles Regional Board	<a href="mailto:Dbacharo@rb4.swrcb.ca.gov">Dbacharo@rb4.swrcb.ca.gov</a>
Jorge Leon	State Water Resources Control Board	<a href="mailto:Jleon@exec.swrcb.ca.gov">Jleon@exec.swrcb.ca.gov</a>
Marilyn Levin	State Department of Justice	<a href="mailto:Levinm@hdcdojnet.state.ca.us">Levinm@hdcdojnet.state.ca.us</a>
Yue Rong	Los Angeles Regional Board	<a href="mailto:Yrong@rb4.swrcb.ca.gov">Yrong@rb4.swrcb.ca.gov</a>
Harry Patel	Los Angeles Regional Board	<a href="mailto:Hpatel@rb4.swrcb.ca.gov">Hpatel@rb4.swrcb.ca.gov</a>
Mercedes Hsu	Los Angeles Regional Board	<a href="mailto:Mhsu@rb4.swrcb.ca.gov">Mhsu@rb4.swrcb.ca.gov</a>
Steven Linder	EPA	<a href="mailto:Linder.steven@epa.gov">Linder.steven@epa.gov</a>
Laurie Williams	EPA Office of Regional Counsel	<a href="mailto:Williams.laurie@epa.gov">Williams.laurie@epa.gov</a>
Brad O'Brien	U.S. Department of Justice	<a href="mailto:brad.o'brien@usdoj.gov">brad.o'brien@usdoj.gov</a>
Greg Lovato	EPA	<a href="mailto:Lovato.greg@epa.gov">Lovato.greg@epa.gov</a>
Lester Kaufman	EPA	<a href="mailto:Kaufman.lester@epa.gov">Kaufman.lester@epa.gov</a>
Walter Crone	Ninyo & Moore (EPA Contractor)	<a href="mailto:Wcrone@ninyoandmoore.com">Wcrone@ninyoandmoore.com</a>
Mike Schwennesen	Ecology and Environment (EPA Contractor)	<a href="mailto:Mschwennesen@ene.com">Mschwennesen@ene.com</a>
Gil Borboa	City of Santa Monica	<a href="mailto:gil-borboa@ci.santa-monica.ca.us">gil-borboa@ci.santa-monica.ca.us</a>
Rey Rodriguez	Contractor – C of SM	<a href="mailto:Mapper3d@aol.com">Mapper3d@aol.com</a>
James Farrow	Contractor – C of SM	<a href="mailto:jfarrow@komexh2o.com">jfarrow@komexh2o.com</a>
Denise Kruger	Southern California Water Company	<a href="mailto:dlkruger@scwater.com">dlkruger@scwater.com</a>
Toby Moore	Contractor – So Cal Water	<a href="mailto:Tbmoore@missiongeo.com">Tbmoore@missiongeo.com</a>

## **VI. QUARTERLY MONITORING**

Conduct Quarterly groundwater monitoring as specified in the SOW. Groundwater level measurements are required to be made on the Monday of the last full week of the month, unless that day is a holiday, in which case gaging will be done on Tuesday. Quarterly groundwater sampling will be conducted during that same week during the months of January, April, July, and October. Quarterly groundwater monitoring reports must be submitted by the fifteenth day following the end of the quarter as shown in the following schedule:

<b><u>Reporting Period</u></b>	<b><u>Report Due Date</u></b>
January-March	April 15 <sup>th</sup>
April-June	July 15 <sup>th</sup>
July-September	October 15 <sup>th</sup>
October-December	January 15 <sup>th</sup>

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## **VII. ANNUAL MONITORING**

Starting with the July 1999 Quarterly Monitoring event, conduct an Annual monitoring event. Annual monitoring event shall include the same requirements as quarterly monitoring with samples analyzed for the following additional analytes:

- alkalinity by EPA Method 310.1,
  - conductivity by EPA Method 120.1,
  - iron, manganese, calcium, magnesium, potassium, and sodium by EPA Method 200.7 or EPA Method 6010,
  - chloride, nitrate, phosphate, and sulfate by EPA Method 150 or EPA Method 300,
  - pH by EPA Method 9045.
-

## **VIII. GENERAL LABORATORY REQUIREMENTS AND DATA VALIDATION**

### **ANALYTICAL PROGRAM (LABORATORY ANALYSES)**

1. Employ a laboratory certified by the California State Department of Health Services, Environmental Laboratory Accreditation Program (ELAP) for each analytical testing method to be used.
2. Specify the method detection limits (MDLs) and estimated quantitation limits (EQLs) as required by Table 3 for low level testing. Report concentrations for constituents identified greater than MDLs and less than estimated quantitation limit (EQL) with a "J" flag indicating an estimated concentration.
3. Report an analytical result as "non-detected" (<MDL, with the MDL specified in parenthesis) only for constituents from samples analyzed without dilution.
4. Take appropriate corrective actions for any QC outliers, laboratory contamination or matrix interference problems and report the corrective actions in support of the analytical results. Do not have results blank adjusted.
5. Include laboratory QA/QC procedures and performance as follows:
  - a) Calibration check standards including the most recent initial calibration range (the lowest to the highest injected concentrations) and average response factors (RF), %RSD, daily RF from continuing (mid-point) calibration and its percent difference from the initial calibration average RF;
  - b) Method blanks (daily);
  - c) Laboratory quality control check samples (LCS) and spiking concentrations (daily). LCS chemical standards and calibration standards must be obtained from different supply sources;
  - d) Surrogate samples and spiking concentrations (each sample);
  - e) Matrix spike and matrix spike duplicates (MS/MSD) (every batch of samples). One MS/MSD shall be required for every sample data group. A sample data group shall consist of no more than 20 samples.
6. Report all analytical results and QA/QC sample results on the LARWQCB Lab Form 10A (Attachment B-1). Run all QA/QC items specified above on the same dates when samples were actually analyzed.

### **DATA VALIDATION:**

The Respondent(s) shall obtain Level 4 data packages from the analyzing laboratory, and a data validation report for each sample data group shall be prepared by a qualified data validation expert. The data validation expert shall approve the data validation reports by signature, and will be responsible for the quality of the resultant data reported to the Agencies.

The data validation expert shall conduct the data validations following 'USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review,' EPA 540-R-94/012," and, as applicable, 'USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review,' EPA 540-R-94/013,"

Level 4 data packages shall consist of:

**SAMPLE RESULTS.** Includes sample ID, analyte concentration, practical quantitation limit, dates of sampling and analysis, chains of custody.

**QC SUMMARIES.** Includes results for method blanks, LCS, MS/MSD, duplicates, surrogates, and internal standards (individual summaries are method-dependent).

**CALIBRATION AND INSTRUMENT PERFORMANCE SUMMARIES.** Includes results for initial calibrations, continuing calibrations, GC/MS tuning, ICP serial dilutions, and interference check samples (individual summaries are method-dependent).

**ALL RAW DATA.** Includes chromatograms, instrument print-outs, run logs, sample prep logs, calibration standard prep logs, method detection limit studies, and sample handling documentation (as appropriate).

#### **FIELD QA/QC SAMPLING PROGRAM:**

Chemical analyses must include the following:

- Equipment blank(s) for every day samples are collected for chemical analysis. Every tool used such as a bailer, SimulProbe, split spoon sampler with sleeves, etc. shall be included.
- Trip blank in every cooler (analyzed for petroleum hydrocarbons, including MTBE)
- All QA/QC samples are to be analyzed for the standard analytical suite (TPH<sub>G</sub>, BTEX, and MTBE, DIPE, ETBE, TBA, and TAME)

#### **SOIL SAMPLE ANALYSIS:**

- 1) Analyze samples in accordance with Table 3 .
- 2) The Agencies have adopted the use of the EQL in order to obtain comparable results from investigations. The EQL is selected as the lowest non-zero standard in the calibration curve. The required EQLs are specified in Table 3.
- 3) Complete initial calibration consisting of a minimum of five points.
- 4) Analyze samples for aromatic hydrocarbons, MTBE, TBA, TAME, DIPE, and ETBE prior to analyses for TPH<sub>G</sub> unless separate samples are obtained at the site.
- 5) Specify and explain extraction method(s) and procedures to be used to prepare samples for hydrocarbon analyses based upon soil type and hydrocarbon characteristics. Fine-grained soils (clay or silt) or long-chain hydrocarbons require sufficient extraction time, which must be identified in the workplan and verified in the laboratory report.

**WATER SAMPLE ANALYSIS:**

- 1) Analyze all water samples in accordance with Table 3. As required by the SOW, conduct additional geochemical analysis in accordance with Table 4.
- 2) The Agencies have adopted the use of the EQL in order to obtain comparable results from investigations. The EQL is selected as the lowest non-zero standard in the calibration curve. The required EQLs are specified in Table 3.
- 3) Complete initial calibration consisting of a minimum of five points.
- 4) Analyze samples for aromatic hydrocarbons, MTBE, TBA, TAME, DIPE, and ETBE prior to analyses for TPH<sub>G</sub> unless separate samples are obtained at the site.
- 5) Analyze trip blanks, equipment blanks, and duplicate samples in addition to QA/QC items specified above.
- 6) Submit a separate sample for turbidity analysis and report result.



<b><i>Table 3</i></b> <b>Analytical Requirements</b>				
<b>Analyte</b>	<b>Matrix</b>	<b>Analytical Method</b>	<b>Required MDL</b>	<b>Required EQL</b>
MtBE	Soil	EPA 8260A	5 µg/kg	10 µg/kg
TBA	Soil	EPA 8260A	10 µg/kg	20 µg/kg
TAME	Soil	EPA 8260A	5 µg/kg	10 µg/kg
DIPE	Soil	EPA 8260A	5 µg/kg	10 µg/kg
ETBE	Soil	EPA 8260A	5 µg/kg	10 µg/kg
TPHg	Soil	EPA 8015 (Modified)	250 µg/kg	500 µg/kg
BTEX	Soil	EPA 8260A	2 µg/kg	10 µg/kg
MtBE	Water	EPA 8260A	2 µg/L	5 µg/L
TBA	Water	EPA 8260A	5 µg/L	25 µg/L
TAME	Water	EPA 8260A	2 µg/L	5 µg/L
DIPE	Water	EPA 8260A	2 µg/L	5 µg/L
ETBE	Water	EPA 8260A	2 µg/L	5 µg/L
TPHg	Water	EPA 8015 (Modified)	50 µg/L	100 µg/L
BTEX	Water	EPA 8260A	1 µg/L	5 µg/L

<b>Table 4</b> <b>Additional Geochemical Analysis</b>			
<b>Analyte</b>	<b>Method</b>	<b>Minimum Limit of Quantification</b>	<b>Precision</b>
Methane	Kampbell, et. al. 1989, Dissolved oxygen and methane in water by a GC headspace equilibrium technique: Int. J. Environ. Analy. Chem., 36: 249-257	1 µg/L	Coefficient of variation of 20 percent
Nitrate, Nitrite, and Ammonia	EPA Method 300	0.1 mg/L	Standard deviation of 0.1 mg/L
Sulfate	EPA Method 300	5 mg/L	Coefficient of variation of 20 percent

## **ATTACHMENT B-1 LARWQCB LAB REPORTING FORMS AND INSTRUCTIONS**

This attachment includes the following documents:

1. Instructions for RWQCB-LA Laboratory Report Form Cover Pages (2 pages)
2. Laboratory Report Form Cover Pages (2 pages)
3. Instructions for LARWQCB Laboratory Report Form for Organics (10 pages)
4. LARWQCB LabForm 10A (4 pages)

## **INSTRUCTIONS FOR RWQCB-LA LABORATORY REPORT FORM COVER PAGES (4/99)**

These instructions assist in the completion of the report format required by the Regional Water Quality Control Board, Los Angeles Region. Other agencies or regulatory bodies may also require the use of this reporting format. The report format is to be applied to all stationary laboratories and mobile laboratories that undertake analyses under RWQCB-LA's jurisdiction. Failure to report in the format required may result in rejection of the analytical results.

Laboratories can use their available software to duplicate the reporting formats. The format and terminology shall be kept the same as this format with the exception of column widths and font types. The shading and grid lines are optional, however they help the reader to locate data easily.

Cover pages 1 and 2 can be used for all RWQCB LabForms. RWQCB LabForm 10A is designed for reporting all organics analyses. RWQCB LabForm 10C is for metal analyses. Do not try to amend the report forms to fit in analyses other than specified.

### Page 1: Laboratory and Project Information

1. Complete the top section of page one with the laboratory information. The laboratory name, address, telephone and facsimile (FAX) numbers, California ELAP Certification number and expiration date are required. The actual expiration date must be entered. If renewal is in the process, enter the expiration date and enter "Renewal in process" under the date.
2. Under "AUTHORIZED SIGNATURE", print or type the name and title of the authorized person who has reviewed the report. This person must sign and date the following line. The authorized person must be the laboratory director, QA/QC officer, or the person who is in charge of reviewing the data.
3. After "CLIENT NAME", enter the full name of the company or agency that submitted the samples to the laboratory for analysis.
4. After "PROJECT NUMBER", enter the number, name and/or site of the project as identified by the client.
5. After "DATE(S) SAMPLED", "DATE(S) RECEIVED" and "DATE(S) REPORTED" enter the date, or range of dates, that the samples were collected and submitted to the laboratory and the sample results were reported to the client (e.g., Date Sampled: 6/2/94 to 6/3/94; Date Received: 6/3/94; Date Reported 6/10/94). The dates sampled and received should correspond to the dates on the chain of custody forms. The date reported is when the results were first released to the client.
6. Circle either "YES" or "NO" to indicate whether or not a Chain of Custody form was received with the samples. Attach a copy of Chain of Custody form.

7. The Comments section is used to describe any problem which occurred with the samples or analysis which may potentially affect the technical or legal defensibility of the data. Examples of problems may include sample head- space, insufficient sample volume, exceeded holding time, and QA/QC outside of acceptance limits. To avoid rejection of data by regulatory agencies, efforts should be made to resolve any of these problems prior to the analysis and release of sample results.

Page 2: Sample Summary

1. Page 2 contains four different analysis sections: ORGANICS (VOCs, TPH, Pesticides, Herbicides, PCBs, etc.), INORGANICS (Metals), MICROBIOLOGICAL, and OTHER TYPES OF ANALYSES. In each applicable section, list the EPA method used, the number of samples analyzed by that method at the laboratory listed on page 1 and the number of samples, if any, subcontracted to another laboratory which must also be certified by ELAP.
2. After "SAMPLE CONDITION" at the bottom of each analysis section, indicate the condition of the samples upon receipt at the laboratory. If the sample condition meets all of the necessary criteria, then enter "Acceptable". If the sample condition does not meet the criteria, enter the deficiency (e.g., no preservative, head-space present, unchilled samples).

**CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD  
LOS ANGELES REGION**

LABORATORY REPORT FORM (COVER PAGE 1)

Laboratory Name: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone/Fax: \_\_\_\_\_

ELAP Certification No./  
Expiration Date \_\_\_\_\_

Authorized Signature  
Name, Title (print) \_\_\_\_\_

Signature, Date \_\_\_\_\_

Client Name \_\_\_\_\_

Project No. \_\_\_\_\_

Date(s) Sampled: (from – to) \_\_\_\_\_

Date(s) Received: (from – to) \_\_\_\_\_

Date(s) Reported: (from – to) \_\_\_\_\_

Chain of Custody Received:    Yes \_\_\_\_\_ No \_\_\_\_\_

Comments \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD  
LOS ANGELES REGION**

LABORATORY REPORT FORM (COVER PAGE 2)

<u>Organic Analyses</u>	# of Samples	# of Samples Subcontracted
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Sample Condition:

<u>Inorganic Analyses</u>	# of Samples	# of Samples Subcontracted
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Sample Condition:

<u>Microbiological Analyses</u>	# of Samples	# of Samples Subcontracted
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Sample Condition:

<u>Other Types of Analyses</u>	# of Samples	# of Samples Subcontracted
--------------------------------	--------------	----------------------------

Sample Condition:

## INSTRUCTIONS FOR LARWQCB LABORATORY REPORT FORM FOR ORGANICS (4/99)

This form can be used for reporting analyses of volatile organic compounds, semi-volatile, petroleum hydrocarbons, PCBs, pesticides, herbicides, and other organics.

### Page 1 of 3: Analytical Result

#### A. Header Information

1. After "Project No:", enter the client's project number (from cover page 1). This number is required on every page of the report.
2. After "METHOD", enter the analytical method used. (e.g., EPA 8240, or EPA methods 8015/8020).
3. After "REPORTING UNIT", enter the appropriate reporting unit. The units ug/L for water samples and ug/Kg for soil samples are recommended for volatile analyses. The units mg/L and mg/Kg are recommended for TPH/semi-volatile analyses.
4. After "DATE ANALYZED", enter the date on which the sample is analyzed.
5. After "DATE EXTRACTED", enter the date on which the sample is extracted with solvent. If no solvent is used (e.g., purge and trap without organic solvent extraction), enter "NA" (Not Applicable).
6. After "LAB SAMPLE I.D.", enter the I.D. number the laboratory assigned to each sample.
7. After "CLIENT SAMPLE I.D.", enter the I.D. number the client used when the sample was collected.
8. After "EXTRACTION SOLVENT", enter the type of solvent used for extraction before purge and trap or injection into instrument.
9. After "EXTRACTION METHOD", enter EPA Method used for extraction. (e.g., EPA 3550). For VOC sample which is extracted with methanol, enter the method used. (e.g., EPA 5030 for EPA 8010, 8020, and 8021. Enter EPA 8240 or 8260 for the GC/MS methods.)
10. After "DILUTION FACTOR", enter the dilution factor for each sample. If a sample is not diluted (e.g., direct purge and trap of water sample), enter "1" as dilution factor.
11. If more than one page is needed, complete the header information for all samples analyzed on the subsequent pages. The method blank does not need to be repeated on each subsequent page. If more than one method blank is analyzed, report each method blank with the samples to which it applies for validation purposes. The column



widths may be changed to put analysis results for more samples on each page.

## B. Analytical Results

1. Under "COMPOUND", list each analyte which the samples were tested for. List the analytes (alphabetical order or elution order are recommended). EPA Methods analyzed in series (e.g., EPA 8015 mod./8020) may be listed on the same results page. For hydrocarbons which cannot be positively identified as a specific product, indicate the type of hydrocarbons detected (e.g., hydrocarbons in the range of C23-C32).
2. Under "CRDL" (Contract Required Detection limit), list the detection limit used for reporting each analyte. Do not adjust the CRDL by the dilution factor for the samples. Any sample dilution which may affect the detection limits for that sample should be indicated under the sample dilution factor.
3. In each column for the method blank and the samples, report all analytes detected above the CRDL. Do not subtract blank or adjust sample results for blank contamination. Any analyte not detected above the CRDL should be reported as "<CRDL value" (whatever the CRDL value is after taking into account dilution factor, e.g., <0.5). Samples must show the final results calculated with dilution factor. (e.g., sample after 10 times dilution gives analysis result of 10 ppb. Then the final result reported for this sample should be 100 ppb.) The CRDL for some analytes may be at or near the laboratory method detection limit as described in 40 CFR 136. However, do not flag any data as estimated or below certain confidence levels.
4. If the list of analytes continues on to the second page, repeat the analytical method, reporting unit, laboratory sample identification and client sample identification on the second page in the spaces provided. Continue with the reporting of detection limits and analytical results as on the first page.
5. If samples are analyzed under different dilution factor, use separate column to report.
6. For SURROGATE, list surrogate compounds added to blank and samples. Report Spike Concentration (SPK CONC) of added surrogate, Acceptable % Limits (ACP%) for each surrogate, and % Recovery (%RC) of each surrogate in blank and each sample. If the analyte list lasts only one page, place the surrogate box at the bottom of the first page. If the analyte list continues on to other pages, place the surrogate box at the bottom of the last page.

## Page 2 of 3: QA/QC Report

### I. Calibration Standard

#### A. Initial Calibration (IC)

1. The initial calibration format provided or direct printouts from analytical instruments can be used as an alternative of the IC format.
2. No matter which IC format (RWQCB form or direct instrument printouts) is used, provide the following data:

Date performed: Date the IC was performed most recently and applied in calculation of the sample results.

Standard Supply

Source: Source of the standard used in IC.

Instrument I.D.: ID or name of the instrument used for IC, QA/QC, and sample analyses.

Analytical

Method: EPA method used in IC, all QA/QC, and sample analyses.

Date of source: Date when standard for IC was received or prepared in-house.

Lot Number: The lot number of the standard used for IC.

Compound: Name of compounds in IC.

Detector: Detector used for analysis of the listed compound.

RT: Retention time of listed compound.

Mass/Conc: Injected mass or concentration of the listed compound. List all five masses or concentrations. Unit must be given (e.g., ng for mass and ug/L for concentration). If concentration is used, volume of standard injected must be reported.

Area: Area count of each concentration level.

RF: Response factor of each concentration level.

RF(ave): Average RF.

SD(n-1): Standard deviation with (n-1) degree of freedom.

%RSD: % relative standard deviation.

B. Continuing Calibration (CC)(Daily Mid-point Calibration)

1. The CC format provided or direct printouts from analytical instruments can be used as an alternative of the CC format.
2. No matter which CC format (RWQCB form or direct instrument printouts) is used, provide the following data:

Compound: Names of compounds in CC.

Detector: Same as above in (A) Initial Calibration.

RT: Same as above in (A) Initial Calibration.

Mass/Conc: Same as above in (A) Initial Calibration.

Area: Same as above in (A) Initial Calibration.

RF: Same as above in (A) Initial Calibration.

%DIFF: Percent difference between RF of continuing calibration and RF(ave) of initial calibration.

ACP RGE%DIFF: Acceptable range for %DIFF.Page 3 of 3: QA/QC Report (Continued)

## II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

1. Under "DATE PERFORMED", enter the date that MS/MSD is performed, which must be the same as the batch of samples that are analyzed.
2. Under "BATCH #", enter laboratory batch number associated with samples.
3. Under "LAB SAMPLE I.D.", enter the name or number of laboratory sample which is used for MS/MSD analyses.
4. Under "Analytical Method", enter the EPA Method and circle a reporting unit. The EPA Method and reporting unit must be the same as that reported for the samples.
5. Circle one to indicate unit.

Provide the following data in the table:

<u>Analyte:</u>	The spiking analytes in sample.
<u>Sample</u>	
<u>Result:</u>	The original sample result associated with the spiking analytes.
<u>Spike Conc:</u>	MS concentration of added analyte in sample.
<u>MS:</u>	Result of MS.
<u>%MS:</u>	% recovery for MS.
<u>Spike Conc</u>	
<u>(Dup):</u>	MSD concentration of added analyte in sample.
<u>MSD:</u>	Result of MSD.
<u>%MSD:</u>	% recovery for MSD
<u>RPD:</u>	Relative percent difference between MS and MSD
<u>MS/MSD</u>	
<u>LIMIT:</u>	Acceptance % limit for MS
<u>RPD LIMIT:</u>	acceptance limit for RPD

If the original sample results are "<CRDL" without dilution, enter "0" for sample result on this MS/MSD table.

## III. Laboratory Control Sample (LCS)

1. After "DATE PERFORMED", enter the date LCS is analyzed, which must be the same as the batch of samples that are analyzed.

2. After "SUPPLY SOURCE", enter source of the LCS standard.
3. After "LOT NUMBER", enter the lot number of the LCS standard.
4. After "DATE OF SOURCE", enter date when standard is used for LCS is received or prepared in-house.
5. After "ANALYTICAL METHOD", enter EPA method used in LCS, which must be the same method used in QA/QC and sample analyses.
6. After "LAB LCS I.D.", enter the laboratory ID number assigned to LCS.
7. Circle one to indicate unit.

Provide the following data in the table:

<u>Analyte:</u>	The LCS analyte.
<u>Spike Conc:</u>	Concentration of LCS analyte.
<u>Result:</u>	Result for each analyte.
<u>%Recovery:</u>	% recovery for LCS.

<u>ACP %REC</u>	
<u>LIMIT:</u>	Acceptance limit for LCS % recovery.

#### IV. General Reporting Requirements

1. Chromatograms, raw data on analysis, copy from logbooks, extraction logs, and other laboratory data relating to sample results are not required with report, but must be submitted upon request.
2. Workplan or monitoring program for a specific project may require additional site-specific analytes and/or conditions.
3. If more space is needed for date of standard supply source, date of preparation, instrument I.D., lot number, a separate sheet shall be used.

#### V. General Requirements For Organics

The following requirements are not a replacement or substitution of the EPA method requirements which must be followed by the laboratories. These requirements serve as a specific emphasis or clarification to LARWQCB's QA/QC objectives in addition to EPA method requirements. Laboratories must comply with these requirements.

##### Sample Condition

The criteria for acceptable sample condition is determined by the method(s) which the samples will be analyzed. The laboratory should try to resolve any sample condition problems before the samples are accepted for analysis. If the problems are beyond being resolved, the samples should be rejected and resampling should be requested.

### Subcontracted Samples

Samples subcontracted to another laboratory, which must be certified by ELAP, must also conform to the requirements of this program and results must be submitted by the subcontracted laboratory on this report format.

### Target Compounds

The target compounds should be those specified in the method or as required by the LARWQCB.

Volatile organic compounds (VOCs) analysis must include the following compounds as target compounds at a minimum. If other compounds are also expected or detected in the samples, they must be included in the target list. GC/MS method (e.g., 8260) and ELCD (electronic conductivity detector)/PID (photoionization detector) in series method (e.g., 8021) must include all target compounds. ELCD method (e.g. 8010) must include all target halogenated compounds. PID method (e.g., 8020) must include all target aromatics.

### **Halogenated compounds**

Bromodichloromethane	cis-1,2-Dichloroethene (c-1,2-DCE)
Bromoform	trans-1,2-Dichloroethene (t-1,2-DCE)
Bromomethane	1,2-Dichloropropane
Carbon tetrachloride	cis-1,3-Dichloropropene
Chlorobenzene	trans-1,3-Dichloropropene
Chloroethane	Methylene chloride (Dichloromethane)
Chloroform	1,1,2,2-Tetrachloroethane
Chloromethane	1,1,1,2-Tetrachloroethane
Dibromochloromethane	Tetrachloroethene (PCE)
1,2-Dichlorobenzene	1,1,1-Trichloroethane (1,1,1-TCA)
1,3-Dichlorobenzene	1,1,2-Trichloroethane (1,1,2-TCA)
1,4-Dichlorobenzene	Trichloroethene (TCE)
1,1-Dichloroethane (1,1-DCA)	Trichlorofluoromethane (Freon 11)
1,2-Dichloroethane (1,2-DCA)	Dichlorodifluoromethane (Freon 12)
1,1-Dichloroethylene (1,1-DCE)	Vinyl chloride (VC)

### **Aromatics**

Benzene	m,p-Xylenes
Ethyl benzene	o-Xylene
Toluene	

CRDL

The detection limits should be those required by the LARWQCB, as specified in the assessment workplan/monitoring program or as specified in EPA methods used. Lower detection limits than these specified below can be required based on site-specific needs. If CRDL cannot be achieved due to matrix problem, laboratory must provide a written explanation and propose a reasonable CRDL under the situation.

CRDLs for VOCs must be 1 ug/L or 2 ug/Kg except for the following compounds. This low CRDLs are applicable to the samples with no detectable VOCs or low levels of VOCs. If sample needs to be diluted due to high contamination, see section concerning dilution in sample analysis requirements.

CRDL of 0.5 ug/L or 1.0 ug/Kg is required for these following compounds because MCLs or Action limits (AL) for these compounds are low as shown.

	MCL	AL
Benzene	1.0	
Carbon tetrachloride	0.5	
1,2-Dichloroethane	0.5	
1,3-Dichloropropene	0.5	
Dichlorodifluoromethane(Freon 12)		1.0
Vinyl chloride	0.5	

CRDL of 100 ug/L or 100 ug/Kg will be acceptable for following compounds.

Acetone  
Acrolein  
Acrylonitrile  
Methyl Ethyl Ketone (2-butanone)  
Methyl Isobutyl Ketone (4-Methyl-2-pentanone)

CRDL shall be 100-500 ug/L or 500-5000 ug/Kg for petroleum hydrocarbons depending on type of hydrocarbons to be tested (e.g., gasoline, jet fuel, diesel, etc.).

Analysis Methods

- For VOCs, if the samples have never been analyzed before (the type of compounds present is unknown), at least 10 % of samples from each site (or a minimum one sample if total samples are less than 10) should be analyzed using GC/MS method (e.g., EPA 8260) first. The rest of samples can then be analyzed with non-GC/MS methods (e.g., EPA 8010, 8020 or 8021) if desired.

2. Laboratory must report the number of tentative identified compounds and estimated results if possible for those samples analyzed by GC/MS method as required by Item 1 above.
3. If the GC/MS method analysis shows the presence of compounds which cannot or will not be detected by non-GC/MS method, then all the samples shall be analyzed by GC/MS method.
4. If the compounds present are known from previous analyses, the samples can be analyzed by either non-GC/MS or GC/MS method.
5. If the PID/ELCD in series method (e.g., EPA 8021) is used, the method must be reported as such (e.g., not reported as 8010/8020).
6. For other organic analyses (e.g., pesticides), confirmation must also be done by GC/MS. If GC/MS cannot confirm the compound due to low level, use second column for confirmation.

#### Initial Calibration

1. Initial 5 point calibration must be performed for all compounds in the above target list and any expected, required, or detected compound.
2. %RSD must be calculated for each compound and must not exceed 20%.
3. For GC/MS analyses, the %RSD of the Calibration Check Compounds (CCC) must be less than or equal to 30%. The CCC are: 1,1-dichloroethene, chloroform, 1,2-dichloropropane, toluene, ethylbenzene, and vinyl chloride.
4. Average Calibration Factor (CF) or Average Response Factor (RF(ave)) must be used for calculation of all sample results and QA/QC analyses.
5. In terms of practicality during compliance with the above requirements, for GC analyses, the percent relative standard deviation (%RSD) must not exceed 20% for 80% of all analytes calibrated. The %RSD for any analyte must not exceed 35%. However the %RSD for all compounds detected in samples must not exceed 20%.

#### Continuing Calibration (CC) (Daily mid-point calibration)

1. In terms of practicality during compliance with the requirement, for GC analyses, the percent difference (%DIFF) from initial calibration must not exceed 15% for 80% of all analytes calibrated. The compounds which meet the 15% difference requirement must be the same compounds which meet the %RSD in initial calibration. The %DIFF for any

analyte must not exceed 35%. However, the %DIFF for all compounds detected in samples must not exceed 15%.

2. For GC/MS analyses, the %DIFF of CCC must not exceed 20%.

#### Surrogate

The surrogate(s) used and surrogate recovery acceptance limits should be determined by the EPA Method guidelines. If there are no EPA guidelines, the laboratory can use the appropriate surrogate(s) and the recovery limits should be in a range determined by in-house laboratory control charts. Data for the control charts must be submitted upon request.

#### Method Blank

The method blank should not show any concentration more than five times (5X) the CRDL for any single target compound. If exceeded, the laboratory should investigate the source of contamination and take corrective actions before proceeding with further sample analysis. Any disclaimer statement such as the following example concerning the blank and interpretation of result will not be acceptable and should not be included in report.

"Results should not be considered reliable unless the sample result exceeds five times (5X) the CRDL or ten times (10X) the blank concentration."

#### MS/MSD

MS/MSD analyses should be performed for every project (for each site) at a minimum rate of one per 20 samples or per batch, whichever is more often. The spiking analytes used for the MS/MSD analyses should be those required by the LARWQCB. When the spiking analytes are not specified by LARWQCB, the ones specified in EPA methods should be used. If EPA method does not specify, then appropriate ones chosen by the laboratory can be used.

If MS/MSD is not required by the method used, MS/MSD may not be required unless specified in workplan.

For VOCs analysis, the following compounds must be included in the spiking for MS/MSD.

#### **Halogenated Compounds:**

Chloroform  
1,1-Dichloroethane (1,1-DCA)  
1,2-Dichloroethane  
1,1-Dichloroethylene (1,1-DCE)  
Tetrachloroethylene (PCE)  
Trichloroethylene (TCE)

#### **Aromatics:**

Benzene  
Toluene

The acceptance limit should agree with EPA guidelines for each method used. If there



are no EPA guidelines, it may be determined in a range by in-house laboratory control charts. Data for the control charts must be submitted upon request. Trace levels of analyte may be used in MS/MSD calculations even if reported as non-detected on the report form.

#### Laboratory Control Sample (LCS)

The LCS analysis must be performed each day that samples are analyzed. The LCS must be obtained from a different supplier or a different lot from the calibration standards. If prepared in-house, it must be prepared from a stock solution different from calibration standards. The LCS should be analyzed in reagent water. It does not have to be matrix matched like the MS/MSD analyses.

The spiking analytes used for the LCS analyses should be those required in the target compound list or those required by the LARWQCB.

The acceptance limits for the LCS for volatile organic analyses are 80%-120%. LCS acceptance limits for other organic analyses should be determined by EPA Method guidelines, or in-house laboratory control charts if there are no EPA Method guidelines for this compound. Data for the control charts must be submitted upon request.

#### Sample Analysis

All samples must be analyzed to comply with CRDL requirements above. If sample dilution is required due to high concentrations of some compounds, the initial run must be used to calculate the results for constituents that are not affected by the high concentrations so that CRDL can be met for these compounds.

If concentrations of compounds present in samples are known to be high (outside the calibration range) from previous analyses or confirmative information, the samples can be directly diluted and then analyzed. Low CRDL will not be applicable for these samples if they are found to be high. If not, an undiluted sample must be reanalyzed to meet the CRDL requirements.

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### ACKNOWLEDGEMENTS

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Project No:\_\_\_\_\_

(RWQCB LabForm10A;Ver4/99)

## ANALYTICAL RESULT FOR ORGANICS

**METHOD:**

**REPORTING UNIT:**

DATE ANALYZED							
DATE EXTRACTED							
LAB SAMPLE I.D.							
CLIENT SAMPLE I.D.							
EXTRACTION SOLVENT							
EXTRACTION METHOD							
DILUTION FACTOR							
COMPOUND		CRDL					
SURROGATE	SPK CONC	ACP%	%RC	%RC	%RC	%RC	%RC

Project No: \_\_\_\_\_

(RWQCB LabForm10A;Ver4/99)

**QA/QC REPORT**

**I. Calibration Standard**

**(A). Initial Calibration**

DATE PERFORMED: \_\_\_\_\_

ANALYTICAL METHOD: \_\_\_\_\_

STANDARD SUPPLY SOURCE: \_\_\_\_\_

DATE OF SOURCE: \_\_\_\_\_

INSTRUMENT I.D.: \_\_\_\_\_

LOT NUMBER: \_\_\_\_\_

COMPOUND	DETECTOR	RT	MASS/CONC UNIT:	AREA	RF	RF <sub>ave</sub>	SD <sub>n-1</sub>	%RSD
Compound 1			1st conc					
			2nd conc					
			3rd conc					
			4th conc					
			5th conc					
Compound 2 . .			.					
			.					
			.					
Compound k			1st conc					
			2nd conc					
			3rd conc					
			4th conc					
			5th conc					

**(B). Continuing Calibration (Mid-Point)**

COMPOUND	DETECTOR	RT	MASS/CONC UNIT:	AREA	RF	%DIFF	ACP RGE %DIFF
Compound 1							
Compound 2							
.							
.							
Compound k							

Project No: \_\_\_\_\_

(RWQCB LabForm10A;Ver4/99)

**QA/QC REPORT (Continued)**

**II. Matrix Spike (MS)/Matrix Spike Duplicate (MSD)**

DATE PERFORMED: \_\_\_\_\_

ANALYTICAL METHOD: \_\_\_\_\_

BATCH #: \_\_\_\_\_

LAB SAMPLE I.D.: \_\_\_\_\_

UNIT: (Circle one)     $\mu\text{g/kg}$      $\mu\text{g/l}$

ANALYTE	SAMPLE RESULT	SPIKE CONC	MS	%MS	SPIKE CONC (DUP)	MSD	%MSD	RPD	MS/MSD LIMIT	RPD LIMIT

Project No: \_\_\_\_\_

(RWQCB LabForm10A;Ver4/99)

**III. Laboratory Quality Control Check Sample (LCS)**

DATE PERFORMED: \_\_\_\_\_ ANALYTICAL METHOD: \_\_\_\_\_

STANDARD SUPPLY SOURCE: \_\_\_\_\_ DATE OF SOURCE: \_\_\_\_\_

INSTRUMENT I.D.: \_\_\_\_\_ LOT NUMBER: \_\_\_\_\_

DATE OF SOURCE: \_\_\_\_\_ UNIT: (Circle one)  $\mu\text{g/kg}$   $\mu\text{g/l}$

ANALYTE	SPIKE CONC	RESULT	%RECOVERY	ACP %REC LIMIT